During normal operation of the AFM, the AFM head assembly is lowered in very small increments towards the sample. When the chamber of the present invention is in place, however, as the head of the AFM is lowered in its normal manner, the sample platform **16** is pushed downwards against the compression springs **14** thereby causing the sample platform **16** to move up towards the AFM scanning probe. Thus, a means for positioning a sample prior to scanning is provided in which the normal operation of the z-directional motor of the AFM can be used to position the sample just below the AFM scanning probe tip prior to scanning.

The use of chamber walls **25** which are thicker than those shown in the preferred embodiment is within the scope of the present invention and in fact may be preferable in that thicker walls will better insulate the chamber, which may be desirable. Alternatively, insulation can be achieved by the use of heat pads, or a heating element, applied to the chamber (not shown). For instance, in situation where a heated environment is desired, warm air with a controlled relative humidity percentage (if desired), can be blown into the chamber through the conditioned air input **9** port, and in order to avoid condensation, the chamber can be maintained at the same temperature by the application of heating pads, or heating elements, to the outside of the chamber.

EXAMPLE

FIGS. **7–11** provide the precise dimensions of an embodiment of the humidity chamber configured to accommodate a scanned-stylus AFM such as that manufactured by Digital Instruments, or as described in U.S. Pat. Nos. 6,032,518; 5,714,682; 5,560,244; and 5,463,897. In FIG. **7**, a hole in the front of the chamber is shown which accommodates the particular optical system used on a current commercially available scanned stylus AFM similar to that described in the aforementioned U.S. Patents. This particular optical system contains a camera with an objective lens that is positioned at an angle approximately 15° from the horizontal plane. Note that the hole in the chamber has a larger diameter than the camera lens. To seal the chamber around the lens, a 2 mm thick piece of silicon rubber (not shown) is mounted on the front of the chamber with the securing plate shown in FIG. **11**. The securing plate has a hole with dimensions larger than the camera lens, but the diameter of the hole in the silicon rubber is slightly smaller than the camera lens, so that the rubber fits snugly around the camera lens to prevent air from escaping. The securing plate and silicon rubber sheet are fastened to the front of the chamber under the overhang (see FIG. **7**) using screws in the positions indicated in FIG. **11**. Two holes are tapped through the back wall of the chamber, as shown in FIG. **7**. These holes are entry and exit ports for humid air to flow into and out of the chamber. Thus, humid air, presumably with a controlled relative humidity percentage, can come in through the entry port and fill up the chamber volume as the ambient air evacuates through the exit port. This process will continue until an equilibrium humidity level is reached in the chamber, at which time, the humid air will continue to flow steadily through the entry port, into the chamber, and out the exit port.

While the present invention has been described with reference to several specific embodiments, those skilled in the art will be able to make various modifications to the described embodiments (for instance, to accommodate different AFMs, or similar microscopes) without departing from the spirit and scope of the invention. It is therefore to be understood that within the scope of the appended claims the invention may be practiced other than as specifically described herein.

What is claimed is:

1. A humidity chamber suitable for use with an atomic force microscope (AFM) comprising a chamber, an integrated sample platform, a spring loaded base and a side entry port.

2. The humidity chamber of claim **1**, wherein said humidity chamber comprises means for accessing an optical microscope lens.

3. The humidity chamber of claim **1**, wherein said humidity chamber provides means for using an optical system to locate and focus on a probe and/or a sample positioned in said chamber.

4. A humidity chamber comprising a design configured to at least partially enclose a scanned-stylus atomic force microscope (AFM), wherein said humidity chamber comprises a chamber, an integrated sample platform, a spring loaded base and a side entry port.

5. The humidity chamber of claim **4**, wherein said humidity chamber comprises means for controlling relative humidity.

6. The humidity chamber of claim **4**, wherein said humidity chamber comprises means for accessing an optical system.

7. The humidity chamber of claim **4**, wherein said humidity chamber comprises an AFM scanning head assembly placed within said chamber, and wherein said integrated sample platform and said spring-loaded base-plate allow samples to be loaded and unloaded without removal of the humidity chamber from the AFM scanning head assembly.

8. The humidity chamber of claim **4**, wherein said chamber completely encloses one or more of an AFM head assembly, an AFM scanning probe, an optical lever detection system, an optical microscope objective lens, and a sample.

9. The humidity chamber of claim **8**, wherein said integrated sample platform and spring loaded base comprise means by which samples are loaded and unloaded without removal of said humidity chamber from said AFM.

10. The humidity chamber of claim **4**, wherein said humidity chamber provides an essentially air-tight fit between the humidity chamber and a scanning head assembly of said AFM.

11. The humidity chamber of claim **4**, wherein said humidity chamber includes means for positioning a sample prior to scanning.

12. A humidity chamber for use with a scanning stylus atomic force microscope (AFM) comprising:

a chamber comprising an aperture fitted to allow insertion of an AFM scanning head assembly and sized to enclose at least a part of said AFM scanning head assembly;

a spring-loaded base with an integrated sample port;

a side-entry port; and

adjacent entry and exit ports which allow humid air to be delivered into the chamber, fill the chamber, and exit the chamber.

13. The humidity chamber of claim **12**, wherein said chamber is essentially air-tight.

14. The humidity chamber of claim **12**, wherein said chamber at least partially encloses an optical lever detection system.

15. The humidity chamber of claim **12**, wherein said sample port can be detached and reattached to said chamber for unloading and loading of samples.

16. The humidity chamber of claim **12**, wherein said sample port can be used to provide a snug fit between said chamber and said AFM scanning head assembly.

17. The humidity chamber of claim **12**, wherein said side-entry port comprises an aperture for insertion of an optical microscope lens into said chamber.